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(3.) Finally we will have to consider the question why the trinomial designation is to be preferred.

I need not repeat the many good reasons admirably set forth by Prof. J. A. Allen in the first number of "The Auk," but I will simply state why I have been of late converted to trinomialism. The question with me hinged on the consideration that in all probability we would have to give up the hope of seeing these forms recognized at all if we would not consent to having them designated differently from the species. There are still many ornithologists who would rather suffer the local races to be extinguished from our books than they would allow them to carry the "sacred" binomials. To them the subspecies are pariahs, which must not be admitted to the "rank" of the aristocratic species. I, myself, think better of the poor subspecies, believing that science in time, when they are fully understood, will derive great benefit from their recognition, and consequently I accept the cumbersome trinomials rather than to see them go around without any name at all.

I regard the trinomials as a nuisance, but as a *very necessary* nuisance, unfortunately. However, I find I can get along with them very well.

Before dismissing the subject I should like to call the attention of American ornithologists to the fact that there are other conditions which may affect the differentiation of subspecific (first, and afterwards specific) forms than the geographical distribution *of the present day*. And in order to learn just what these conditions are it is very important to have the subspecies distinguished. The geographical range of a bird is by no means a very stable thing, and may change comparatively rapidly, for many reasons. It may therefore be that some of the variations date back to a—perhaps not so very—distant time when the range of the form was one quite different from the present one. The fact that the differentiation in a certain form does not agree with what we conclude it ought to do compared with other forms of similar geographical distribution must not lead us to disregard their differences.

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DESCRIPTIONS OF SCAROID FISHES FROM HAVANA AND KEY WEST, INCLUDING FIVE NEW SPECIES.

By DAVID S. JORDAN and JOSEPH SWAIN.

In a recent collecting tour to Havana, Cuba, and Key West, Florida, Professor Jordan obtained a considerable number of Scaroid fishes, representing fourteen species. Seven of these were secured at Key West

and thirteen in the markets of Havana. Five appear to be still new to science, or at least not yet recognizably described.

Our materials are not yet sufficient for a general revision of the American Scari. Very few of the many species can yet be said to be well known, and the present paper is offered as a contribution toward an exact knowledge. We give descriptions and life coloration of each of the species included in this collection, with the synonymy of each, and a key by which these species may be distinguished. To species not included in this collection we make in general no reference.

In our descriptions of the species we have generally avoided the repetition of characters common to all, as well as those which are dependent on the age of the specimen and not upon specific difference. Most of the differences in form and proportions of the body belong to this latter class. Generally speaking, it is only the canine teeth, the scales of the head, the scales of the lateral line, the caudal fin, and the coloration which afford specific characters. The dorsal fin, the lower pharyngeals, and the isthmus afford generic distinctions, but are essentially similar in all the species of the same genus. In all the species the numbers are usually D. IX, 10. A. II, 9. Scales $2\frac{1}{2}$ —24—6.

Three well-marked generic groups are represented in this collection. For these we should, in accordance with generally received laws of nomenclature, adopt the names *Scarus*, *Sparisoma*, and *Cryptotomus*. These correspond respectively to *Pseudoscarus*, *Scarus*, and *Calliodon* of Bleeker and Günther.

Of these genera, *Cryptotomus* approaches most nearly to the typical Labroids; *Sparisoma* is closely allied to it, while *Scarus* represents a considerable differentiation. Most writers, with Dr. Günther, have distinguished *Scarus* and *Sparisoma* chiefly by the number of rows of scales on the cheek, a character in itself of no systematic importance. On account of the trifling value of this character, several writers (Steindachner, Cope, Jordan, and Gilbert) have preferred to consider the groups thus defined as subgenera merely. An examination of many species leaves, however, no doubt that *Sparisoma* and *Scarus* are fully worthy of generic distinction, and, unless intermediate forms occur, *Cryptotomus* should be separated from *Sparisoma*.

ANALYSIS OF GENERA.

- a. Lower pharyngeal spoon-shaped, much longer than broad; teeth of jaws fully coalesced; each jaw divided by a distinct median suture; gill-membranes forming a fold across the isthmus; dorsal spines flexible; lateral line interrupted, &c.; scales about head rather numerous, lower jaw included SCARUS, A.
- aa. Lower pharyngeals broader than long, flattish, or basin-shaped; gill membranes broadly joined to the isthmus, not forming a fold across it; lateral line subcontinuous; scales on head rather few.
 - b. Teeth chiefly coalescent, the jaws divided by a rather indistinct median suture; dorsal spines pungent; lower jaw projecting..... SPARISOMA, B.
 - bb. Teeth coalescent laterally; the anterior chiefly separate; the median suture not evident; dorsal spines flexible..... CRYPTOTOMUS, C.

A. Genus SCARUS.

- SCARUS Forskål. Descr. Animal, &c., in Orient. Observ. 1775, 25 (*psittacus*, &c.).
 CALLYODON Gronow. Museum Ichthyol., II, 8 (non-binomial).
 CALLIODON Bloch & Schneider. Syst. Ichthyol., 1801, 312 (*lineatus*=*croicensis*).
 HEMISTOMA Swainson. Class'n. Fishes, &c., 1839, II, 226 (*reticulatus* Sw.=*pepo* Bennett).
 PETRONASON Swainson. Class'n, Fishes, &c., 1839, II, 226 (*psittacus*, &c.).
 ERYCHTHYS Swainson. Class'n, Fishes, &c., 1839, II, 226 (*croicensis*, &c.).
 CHLORURUS Swainson. Class'n, Fishes, &c., 1839, II, 227 (*gibbus*).
 CALLYODON Gronow. Systema, Ed. Gray, 1854, 83 (*lineatus*, &c.).
 PSEUDOSCARUS Bleeker. Versl. Akad. Wet. Amsterd., XII, 1861, Scaroid. 3 (*chlorodon*, *psittacus*, &c.).
 PSEUDOSCARUS Günther. Poey, Guichenot et Auct.
 SCARUS Jordan & Gilbert. Syn. Fish N. A., 1883, 938 (*psittacus*, *guacamaia*).

The name *Scarus* was used by the ancients and by some pre-Linnæan writers on zoölogy for the Mediterranean species of *Sparisoma*, *Labrus cretensis* L.

Its first use in any way as a generic name in binomial nomenclature is that of Forskål in 1775. The genus *Scarus* of Forskål was based on several species obtained by him on the coasts of Arabia. A few of these are not Scaroids. The others all belong to the group called *Pseudoscarus* by Bleeker. Forskål had apparently no acquaintance with the *Labrus cretensis*, and this species cannot in any proper sense be taken as the type of his genus. One of the species mentioned by him should be so taken, and as all his Scari belong to the same group, it makes no special difference which one is selected. Jordan & Gilbert have regarded *Scarus psittacus* Forskål as the type. If, however, *Sparisoma cretense* be taken as the type of *Scarus*, the proper name for the present genus would be *Calliodon*, and several of the useless generic names of Swainson have priority over *Pseudoscarus*.

The genus *Scarus* contains the majority of the species of this group. It is more widely distributed than the other genera; its species reach for the most part a larger size, and in general they are more brightly colored than the others.

ANALYSIS OF SPECIES OF SCARUS.

COMMON CHARACTERS.—Lower pharyngeals spoon-shaped, ovate-oblong, transversely concave; teeth in each jaw fully coalescent, appearing as tessellations on the surface; jaws with distinct median suture; edges of jaws even; upper pharyngeals each with two rows of teeth; gill-membranes scarcely united to the narrow isthmus, across which they form a broad fold; dorsal spines flexible, scarcely different from the soft rays; upper lip laterally double, the interior fold becoming very narrow or obsolete mesially; lower jaw included in the closed mouth; lateral line interrupted posteriorly, commencing again on the next series of scales below; tubes of lateral line scarcely branched; scales on cheek in two to four rows; scales in front of dorsal on median line 6 to 8. Species mostly of large size.

a. Teeth deep green; no canine teeth; cheeks with two rows of scales, those of the upper row larger than those of the second; one scale below the lower row; caudal subtruncate, the angles produced, especially in the adult. Olive green, with ill-defined green markings on head; lower parts more or less reddish; vertical fins brownish orange, all edged with deep blue. Size large. GUACAMAIA, 1

aa. Teeth whitish or rosy.

b. Angle of mouth without canine.

c. Third row of scales of the cheek of one or two scales only; scales of the upper row much larger than those of the second row; caudal subtruncate, its outer rays more or less produced; adult with a fleshy hump above the snout; color bright blue, the young more or less shaded with reddish brown; fins mostly blue. Size large.....CÆRULEUS, 2

cc. Third row of scales of the cheek of three or four scales; scales of the upper row little larger than those of the second row; caudal slightly rounded, its outer rays not produced. Reddish, with three longitudinal blackish stripes, the second through eye to base of caudal; usually three whitish streaks on lower part of sides; fins chiefly orange.....CROICENSIS, 3

bb. Upper jaw with a posterior canine (rarely duplicated); cheeks with two and a half rows of scales; caudal subtruncate, its outer rays scarcely produced; head with two bluish green stripes, the interspaces reddish or yellow; general color bluish green, mixed with orange; dorsal and anal each with two green bands and one orange one.

d. Outer rays of caudal chiefly orange; yellow stripe above pectoral, below the level of the green stripes on head, which are nearly horizontal; orange stripe on dorsal and anal fins without blue spots.....VIRGINALIS, 4

dd. Outer rays of caudal deep greenish blue; yellow stripe above pectoral (if present), above the level of green stripes on head, which are somewhat oblique; orange stripe on dorsal and anal spotted or shaded with blue.....PUNCTULATUS, 5

1. *Scarus guacamaia*.

Guacamaia Parra, Descr. Dif. Piezas Hist. Nat., 1787, p. 54, pl. 26 (Cuba).

Scarus guacamaia Cuvier, Règne Animal, ed. ii, 1829, 265. (No descr.; based on Parra. Not *Scarus guacamaia* Cuv. & Val. = *Scarus pleianus* Poey.); Jordan & Gilbert, Syn. Fish. N. A., 1883, 938.

Pseudoscarus guacamaia Günther, iv, 233 (Jamaica, Puerto Cabello, Bahia); Poey, Synopsis Pisc. Cubens., 1868, 348, 463; Poey, Enumeratio Pisc. Cubeus., 1875, 117.

Hemistoma guacamaia Jordan & Gilbert, Syn. Fish., N. A., 1883, 607 (Key West).

Head, 3 ($3\frac{1}{7}$ in length to base of caudal); depth, $2\frac{3}{4}$ ($3\frac{2}{5}$); length of example described (Key West), $7\frac{1}{2}$ inches.

Body moderately elongate.

Jaws deep bluish-green, the color not fading in spirits; no canine teeth; upper lip covering more than half of surface of upper jaw.

Snout not very obtuse, $2\frac{2}{3}$ in head; eye small, 6 in head; cheeks, with two rows of scales of five or six in each row, those of the upper row nearly twice as broad as those of the lower; a single scale below the lower row; six or seven scales on median line before dorsal.

Caudal rounded when spread open, its angles slightly produced, its outer rays (in specimens 8 inches long), $\frac{1}{2}$ in head. In adults the outer rays are longer in proportion, and in very old examples, none of which were seen by us, they are said to be greatly produced.

Color in life, of specimens of moderate size, olive green, each scale edged with clear brown; its middle, especially above, bright verdigris green. Sides of head brownish-gray; belly white, tinged with brown;

a bright green stripe from eye around snout; another from eye to eye above; another undulating stripe below eye; several green spots and dashes behind eye; upper lip reddish; naked skin of middle of lower jaw green; teeth deep greenish-blue; vertical fins all brownish-red, verging on orange above; their edges, including sides and tip of caudal all bright greenish-blue; ventral flesh-color, tinged with orange, its anterior edge greenish-blue; pectoral very pale reddish, the first and last ray light blue; a greenish dot at the base of each membrane of dorsal and anal; axil reddish.

Older specimens are similar in color, but with the head more pinkish and its markings more diffuse. In spirits the green stripes and spots on head become fainter; the red of upper lip and axil and the orange of fins fade.

This species is abundant about rocks at Key West, and is also not uncommon in the Havana market, where it is known still as *Guacamaia*. Our fish appears to be the *Guacamaia* of Parra, on which, so far as the printed record shows, the *Scarus guacamaia* of Cuvier was based. The specimens in Cuvier's possession, afterwards described by Valenciennes under the name of *Scarus guacamaia*, have canines in the upper jaw, and apparently belong to a distinct and (to us) unknown species, to which Poey has given the name of *Scarus pleianus*. We have seen no specimens a yard in length, as mentioned by Parra, nor have we seen any with the caudal lobes prolonged to the extent shown in his figure.

None of our specimens, young or old, show traces of canines.

2. *Scarus cœruleus*.

Novacula cœrulea (the *Bluefish*). Catesby, Nat. Hist. Carolina, &c, 1743, ~~118~~, tab. 18 (Bahamas).

Loro Parra, Deser. Dif. Piezas Hist. Nat., 1787, 57, lam. 27, f. 1 (Cuba).

Trompa Parra, l. c. f. 2.

Coryphæna cœrulea Bloch, Ausländische Fische, ii, 120, taf. 176, 1783. (In part, after Catesby and a figure by Aubriet, altered from a figure by Plumier.) Gmelin, Syst. Nat., 1788, 1191 (copied).

Scarus cœruleus Bloch & Schneider, Systema Ichthyol., 1801, 288. (After Catesby, and Trompa of Parra.); Cuv. & Val. xiv, 186, 1839 (St. Thomas); Cuvier, Règne Animal, ed. II, 1829.

Pseudoscarus cœruleus Günther, iv, 1862, 227 (copied). Guichenot, Scaridés, Mns. Paris (Proc. Soc. Imp. Nat., Cherbourg), 1865, 24 (St. Thomas, San Domingo); Poey, Repertorio, i, 373, 1867; Poey, Synopsis, 1868, 348; Poey, Enumeratio, 1875, 117 (Cuba); Goode, Bull. U. S. Nat. Mus., v, 33, 1876 (Bermuda).

Scarus loro Bloch & Schneider, Systema Ichthyol., 1801, 288. (After *Loro* of Parra).

? *Scarus trilobatus* Lacépède, Hist. Nat. Poiss., iv, 1803, 21 (on a drawing by Plumier).

? *Sparus holocyancos* Lacépède, Hist. Nat. Poiss., iv, 1803, 45 (on a copy by Aubriet of a drawing of Plumier; the copy colored entirely blue in order to represent this species; the original drawing probably intended for *Sparisoma chrysopterum*: the same copy by Aubriet, the original of Bloch's engraving of *Scarus cœruleus*).

2. *Scarus cœruleus*—Continued.

Scarus obtusus Poey, *Memorias Cuba*, ii, 1860, 217 (Cuba).

Pseudoscarus obtusus Poey, *Synopsis*, 349; Poey, *Enumeratio*, 117.

Scarus nuchalis Poey, *Memorias*, ii, 1860, 220 (Cuba).

Pseudoscarus nuchalis Poey, *Synopsis*, 348; Poey, *Enumeratio*, 117.

Pseudoscarus chloris Günther, iv, 1862, 227 (Jamaica; Excl. Syn.).

Pseudoscarus quadrispinosus Goode, *Bull. U. S. Nat. Mus.*, v, 34. (Not *Scarus quadrispinosus* Cuv. & Val.)

Head, $3\frac{1}{8}$ ($3\frac{5}{8}$); depth, $3\frac{1}{8}$ ($3\frac{5}{8}$); length of example described (Havana), $10\frac{1}{2}$ inches.

Body rather elongate.

Jaws whitish in the adult, rosy in the young; no canine teeth; upper lip covering about half of upper jaw.

Eye small, $5\frac{2}{3}$ in head; snout rather acute, $2\frac{4}{5}$ in head; cheeks with two rows of scales, the scales of the upper row nearly twice as broad as those of the lower; below the lower row is a partial row of two scales; six scales on median line of back before dorsal.

Caudal slightly rounded; when spread open its outer rays a little produced, $1\frac{2}{5}$ in head, in young of a foot in length, said to be much longer in adult; color in life, of partly-grown specimens from Havana, bright sky-blue everywhere; some brown on upper scales; lower lip reddish brown, edged with blue; fins blue, with some brown; teeth pale reddish.

Color of young (4 inches), taken at Key West, light, livid blue-gray, tinged with brownish on back, quite bluish below; yellowish olive on top of head, but no sharp markings anywhere except on fins; jaws rather bright flesh-red, the snout bluish; teeth pale; dorsal edged with bright blue; below this dull orange; its base livid; caudal grayish; faintly banded with olive, its upper and lower edge bright blue; anal flesh-color, edged with light-blue; ventrals greenish-blue color fading on last rays; pectorals flesh-color, axil light blue.

Color in spirits greenish-olive above, pale below; dorsal dusky; caudal and anal grayish; fins otherwise pale.

This species is common in the Havana markets. A single young specimen was taken at Key West.

No specimens of more than a foot in length were obtained, and these show but slight traces of the fleshy hump on the snout, which is said to be very conspicuous in the adult fish. They correspond fairly to the *Loro* of Parra and to the *Scarus obtusus* of Poey. It is possible that these specimens are not the young of the large-humped *cœruleus*, but as no differences other than in the development of the hump and of the lobes of the caudal are to be found, we refer them, without much hesitation, to *S. cœruleus*. The same opinion is expressed by Günther, who considers his *chloris* as probably the young of *cœruleus*. His *chloris* is evidently our fish, though not the *chloris* of Bloch.

There is some confusion in regard to the original *Coryphæna cœrulea* of Bloch, which must be regarded as in part only based on this species.

The *Scarus cœruleus* of Bloch & Schneider is, however, free from any confusion with *chrysopterum* or related species. *Scarus trilobatus* Lacépède is somewhat doubtful, and *Sparus holocyaneos* Lac. is involved in confusion with *Sparisoma chrysopterum*. The *obtusus* and *nuchalis* of Poey are probably forms of *cœruleus*. *Scarus quadrispinosus* C. & V. is evidently different, having two canines on each side of the upper jaw.

3. *Scarus croicensis*.

- Callyodon* Gronow, Museum Ichthyol., II, 8. 1763; Gronow, Zoöphyllaceum, 244, t. 7, f. 4. (*Sine patria*).
- Scarus croicensis* Bloch, Ichthyol., taf. 221, about 1785. (St. Croix; probably more than one species included); Jordan & Gilbert, Syn. Fish., N. A., 1883, 938 (copied).
- Erychthys croicensis* Swainson, Nat. Hist., Class'n, Fishes, 1839, ii, 226 (name only).
- Scarus insulæ-sanctæ-crucis*, Bloch & Schneider., Systema Ichthyol., 1801, 285, (copied).
- ? *Calliodon lineatus*, Bloch & Schneider, Syst. Ichthyol., 1801, 312, pl. 62, f. 2, after Gronow; Gronow, Syst., ed. Gray, 1854, 84. (*Sine patria*).
- Scarus alternans* Cuv. & Val., iv, 1839, 200, (Martinique).
- Pseudoscarus sanctæ-crucis* Günther, iv, 226, 1862, (Jamaica; Trinidad; Puerto Cabello); Guichenot, Scaridés Mus. Paris, 1865, 29 (Martinique); Poey, Synopsis, 1868, 350, (Cuba); Poey, Enumeratio, 1875, 119.
- Scarus sanctæ-crucis* Cope, Trans. Am. Philos. Soc., 1870, 461, (St. Croix).
- Pseudoscarus lineolatus*, Poey, Repertorio, ii, 239, 1868, (Cuba); Poey, Synopsis, 350; Poey, Enumeratio, 1875, 119.

Head, 3 ($3\frac{5}{7}$); depth, 3 ($3\frac{5}{7}$); length of example described (Havana), 7 inches.

Body comparatively elongate.

Jaws reddish; no canine teeth; lip covering most of surface of upper jaw.

Eye small, $5\frac{1}{4}$ in head; snout not obtuse, $2\frac{3}{4}$; cheeks with three rows of scales, the lower with three or four scales, those of the upper row scarcely larger than those of the second row; seven scales on median line before dorsal; caudal slightly and evenly rounded, its outer rays $1\frac{1}{2}$ in head. Not at all produced in specimens examined.

Color in life, of young of 2 to 4 inches, dark-olive, little mottled, rosy below, on bases of scales and lower part of head; two dark, lateral, parallel stripes, the upper passing through eye and about equaling it in width, being twice as wide as lower stripe, which meets base of pectoral; teeth light-reddish; dorsal orange yellow, its edge pale bluish; caudal and anal similar, the former mottled; ventrals red-orange; pectorals plain, the base yellowish without dark blotch.

In spirits the rosy color becomes grayish, and all the fins pale.

Older specimens, 7 to 9 inches in length, are dark, reddish-brown above, paler below; back dark, sides with two dark parallel stripes of the color of the back, separated by pale interspaces, the upper one backward from eye; snout above bluish-brown, a narrow whitish streak running from head along the middle line of belly; three similar

streaks on each side of breast, there being one on each row of scales; teeth dark red; a dusky blotch at base of pectoral; caudal pale, orange-red, with dusky on tip and sides, the outer rays being somewhat barred with brown; anal light bluish-dusky, paler in front and on edge; ventrals and pectorals pale; dorsal orange, edged with bluish.

Several young specimens of this species were taken at Key West. In Havana it is rather common, and is known as *Bullon*.

It seems never to reach a large size. Goode has suggested that it is perhaps the young of *Scarus vetula* (= *superbus* Poey), but we are very positive that this cannot be the case. The two are very unlike in dentition as well as in color.

There is no warrant for the change of the original name, *croicensis*, into *sanctæ-crucis*, and we have, as a matter of course, restored the original form of the word.

The *Calliodon lineatus* seems to us, as suggested by Valenciennes, as probably this species.

Poey recognizes *Pseudoscarus lineolatus* with the three streaks along the side of the breast, as shown by our specimens, and *P. sanctæ-crucis*, in which these markings are obsolete.

In the absence of other characters, we cannot regard such a color-mark as probably indicating specific distinction.

4. *Scarus virginalis*, sp. nov.

Scarus vetula Cuv. & Val., xiv., 193, 1839 (St. Thomas; not of Bloch & Schneider, based on a figure of Parra, representing *Scarus superbus* Poey).

Pseudoscarus psittacus Günther iv., 225, 1862 (Cuba; Jamaica; after *Coryphana psittacus* L., which is a species of *Xyrichtys*; not *Scarus psittacus* Forskål, an Asiatic species); Guichenot, Searidés Mns. Paris, 1865, 25 (Martinique; St. Lucia); Poey, Synopsis, 347 (Cuba); Poey, Enumeratio, 116.

Scarus psittacus Cope, Trans. Am. Philos. Soc., 1871, 461 (St. Martins; St. Croix).

Head, 3 ($3\frac{2}{3}$); depth, $2\frac{2}{3}$ ($3\frac{1}{3}$); length of the typical example (Havana), $9\frac{1}{2}$ inches.

Body oblong-elliptical.

Jaws pale; a canine directed backward and outward above the angle of the mouth; upper lip covering more than half of surface of upper jaw.

Eye small, 6 in head; snout rather acute, $2\frac{5}{6}$ in head; cheek with two nearly equal rows of about six scales each; one or two large scales below the lower series; eight scales on median line of back before dorsal.

Caudal fin when spread open very slightly rounded; the outer rays very slightly produced, $1\frac{2}{5}$ in head, in specimens of 9 inches.

Color in life dark orange-brown above; the centers of each scale greenish-blue; rather abruptly paler below, where the blue predominates as it does also on caudal peduncle; sides of head with two hori-

zontal stripes of deep bluish-green, running from angle of opercle through eye and meeting around snout, the interspace anteriorly yellowish, posteriorly brownish; head light-greenish below; two green stripes, with a yellowish interspace on lower jaw; a broad, bright yellow band *below* level of green stripes of head, running from base of pectorals backward nearly to middle of body.

Dorsal fin greenish-blue on lower half; above this a broad orange band, the fin margined with sky-blue; caudal indigo-bluish, with some vague yellow shades; the outer rays bright orange, edged with indigo-bluish; anal greenish, blue at base, then a rather narrow stripe of orange, the outer half of the fin bluish; ventrals greenish and yellowish; pectoral light yellow, no dark blotch at its base.

In spirits the orange fades to yellowish and the blue to bright green. The yellow lateral band is in spirits dashed with red.

This beautiful species is not uncommon at Havana, where several specimens were obtained.

The name *psittacus* has been used by recent writers for this species. The original type of *Coryphæna psittacus*, sent by Dr. Garden from Charleston, is still preserved by the Linneæan Society of London. It has been examined by Dr. Bean, who has found it to be a *Xyrichtys*.

There seems to be also no doubt that the original *Vieja* (pl. 28, f. 1), of Parra, on which the *Scarus vetula* of Bloch & Schneider is based, is identical with the *Scarus superbus* of Poey, rather than with the present species, to which it has been referred by Cuvier & Valenciennes. The name *vetula* must therefore supersede *superbus*, as already noticed by Mr. Goode. (Bull., U. S. Nat. Mus., v, 32.) As described by Dr. Günther, *Scarus vetula (superbus)* differs from the present species in the number of scales on the cheek, in dentition, and in coloration, although in the latter respect the two have much in common. As neither *vetula* nor *psittacus* are available as specific names for the present species, we propose for it the new name of *Scarus virginalis*.

5. *Scarus punctulatus*.

Scarus punctulatus Cuv. & Val, xiv, 1839, 195 (Martinique).

Pseudoscarus punctulatus Guichenot, Scaridés Mus. Paris, 1865, 26 (Martinique).

Pseudoscarus taniopterus Günther, iv, 226 (Trinidad; excellent description; not of Desmarest?).

Pseudoscarus diadema Poey, Synopsis, 347; Poey, Enumeratio, 116 (not *Scarus diadema* C. & V., nor of Cope).

? ? *Scarus taniopterus* Desmarest, Diet. Classique, xv, 244, pl. 12, 1831 (Cuba); ? ? Cuv. & Val., xiv, 195 (same type).

? ? *Pseudoscarus taniopterus* Guichenot, Scaridés Mus. Paris, 1865, 26 (same specimen).

Head, $3\frac{1}{2}$ ($3\frac{2}{3}$); depth, $3\frac{1}{3}$ ($3\frac{5}{6}$); length of specimen described (Havana), 6 inches.

Body oblong-elliptical.

Jaws whitish; a canine directed outward above angle of mouth on

each side; a second small canine present on one side in the specimen described; upper lip covering about half of surface of upper jaw.

Eye small, $5\frac{1}{4}$ in head; snout rather acute, $2\frac{3}{8}$ in head; cheek with two rows of scales, those of the upper row being about one-third larger than those of the second row; two scales below the lower series; seven scales before dorsal.

Caudal fin truncate or slightly rounded when spread open, the angles not produced; (in specimen of 6 inches) the outer rays $1\frac{3}{4}$ in head.

In life orange-brown; the centers of most of the scales bright bluish-green, these blotches large, so that the green predominates over the orange on most of the body. On the anterior part of the back and on top of head there is little green, this region being more brown.

A light-yellow longitudinal band, higher up than the similar band in *S. vetula*, and above the level of the green stripes on head, running backward from upper part of gill-opening nearly to end of pectoral; below this is a dark, grayish band about as broad as eye, extending about to end of pectorals; this is bordered above and below by bright green. These green stripes become very distinct on the head, where they extend forward on snout, one above and one below the eye, the lower meeting its fellow on the upper lip, the upper on the forehead; interspace between these bands dark gray; a grass-green band around lower jaw; lower half of head light yellowish-green; belly pale-greenish; dorsal and anal bright green at base and tip, mesially orange, the orange with a median more or less interrupted band of blue, the corresponding band on anal forming a row of spots; caudal bright greenish-blue, the outer rays entirely blue, the inner with their membranes orange; pectoral pale yellow; the axil not dusky.

This species is very close to the preceding, differing so far as we can see only in the arrangement of the colors.

But a single specimen was obtained. This answers almost exactly to Guichenot's description of the type of *Scarus punctulatus* and to Gunther's *Pseudoscarus teniopterus*.

Scarus diadema C. & V. appears to be somewhat different, as also *Scarus teniopterus* Desmarest. It is possible, however, that the type of the latter is faded and has lost the markings of the head. In that case the appropriate name of *teniopterus* should supersede *punctulatus*. At present this identification is too doubtful to justify this change of name.

B. Genus SPARISOMA.

SCARUS, sp. Auct.

SPARISOMA Swainson, Nat. Hist. Class'n, Fishes, &c., 1839, ii, 227 (*abildgaardi*).

SCARUS Bleeker, Versl. Akad. Wet. Amsterdam, xii, 1861, Scaroid, 3 (*cretensis*).

SCARUS Günther, Poey, Guichenot, et auct. (*cretensis*).

SPARISOMA Jordan & Gilbert, Syn. Fish. N. A., 1883, 938 (*abildgaardi*).

We have elsewhere given the reasons which have led us to retain the name *Scarus* for the group (*Pseudoscarus*) to which the species originally described by Forskål belong.

This being done the only name applicable to the present group is that of *Sparisoma* Swainson. As originally defined this generic name was a wanton synonym like nearly all the other generic names of fishes proposed by Swainson. It is supposed to differ from the *Petronason* of the same author in the presence of hexagonal scales, sharp incisive teeth, and obtuse canines. As, however, its type, *S. abildgaardii*, is a member of the present genus, the name should not be set aside.

ANALYSIS OF SPECIES OF SPARISOMA.

COMMON CHARACTERS.—Lower pharyngeal broader than long, subhexagonal, its surface moderately concave or flattish; teeth in each jaw largely coalescent in the adult, their tips more or less separate in the young, the edge, especially of the lower jaw, remaining uneven; the median suture in each jaw present, but not well defined; one to four radiating canines sometimes present on each side of upper jaw above its cutting edge; * gill-membranes broadly united to the isthmus; dorsal spines pungent; upper lip double for its entire length; lower jaw projecting beyond upper; lateral line not interrupted, passing gradually from its row of scales posteriorly to the one next below it; tubes of lateral line much branched; scales about head large, those on cheek in a single row, those on the median line in front of dorsal 3 or 4 in number. Species of rather small size, most of them American.

- a. Upper jaw without canines; caudal lunate in adult, subtruncate or mesially rounded in the young; head without bright stripe.
 - b. Caudal fin with obscure bars and spots, its general color pale orange; no distinct green or blue anywhere; body olivaceous, much clouded, and washed with cherry red; lower fins mostly red; pectorals light orange; axillary spot usually distinct.....FLAVESCENS, 6.
 - bb. Caudal fin without bars or spots, its outer rays green, its inner ones red; some greenish-blue on head; axillary spot very distinct; body olivaceous, nearly plain, yellowish below.....FRONDOSUM, 7.
- aa. Upper jaw with one or more canines above its cutting edge.
 - c. Caudal fin deeply lunate, the upper lobe about as long as head and twice or more length of inner rays.
 - d. Canines 3 or 4 on each side; pores of lateral line excessively branched, each with several (6 to 8) much divided branches; color bright greenish-blue (the side sometimes with a blue band); caudal lobes blue, the middle rays red; dorsal and anal red; pectorals yellowish, the axillary spot large, black, edged with red..CHRYSOPTERUM, 8.
 - dd. Canines 1 or 2 on each side; pores of lateral line each with few (4 or 5) nearly simple branches; color in life chiefly light blue, without sharp markings, this color becoming reddish in spirits; caudal lobes dull greenish; the middle rays reddish; other fins mostly scarlet; axillary spot well defined.....LORITO, 9.
 - cc. Caudal fin lunate, the outer rays exerted, but not twice as long as the inner rays and much shorter than the head; canine single on each side (rarely obsolete or duplicated).
 - e. Head with a scarlet stripe from below eye to angle of mouth; a small scarlet streak behind eye; color chiefly purplish-brown; a round spot of yellow and black behind head, just below lateral line; fins chiefly red; angles of caudal black; axillary spot obscure.

AUROFRENATUM, 10.

* In species normally possessing a single canine on each side (*aurofrenatum*; *abildgaardii*) it is occasionally absent on one or both sides, and sometimes specimens are found with one more than the normal number on one or both sides. We find no evidence that the disappearance of the canines is a matter of age, although in all species the edges of the jaw are less uneven in the adult.

ee. Head unstriped; color dark reddish-brown, with whitish mottlings; belly and fins mostly cherry red; axillary spot obsolete.

ABILDGAARDI, 11.

ccc. Caudal fin subtruncate, the angles rounded, the outer rays not longer than the median ones; canines 2 to 4 on each side, the anterior pair near the median suture of upper jaw (perhaps obsolete with age); size small.

f. Canines usually 2 to 3 (on different sides); color, olive-green, much mottled, reddish below; edge of opercle, axillary region and a blotch on base of pectoral deep greenish-blue; upper fins olivaceous; anal and caudal without black; axil without black.....CYANOLENE, 12.

ff. Canines usually 3 to 4 (on different sides); color, olive-green above, mottled and speckled with red; snout with blue lines; axil and base of pectoral black; fins mostly light orange and yellow, the anal and caudal in the adult largely black.....XYSTROBON, 13.

6. *Sparisoma flavescens*.

Vieja Parra, Descr. Dif. Piezas Hist. Nat. 1787, 59, pl. 28, f. 4 (Cuba).

Scarus flavescens Bloch & Schneider, Syst. Ichth., 1801, 290 (after Parra); Poey, Enumeratio, 1875, 113 (identification of *Sc. squalidus* with Parra's figure).

Callyodon flavescens Cuv. & Val., xiv, 289, 1839 (after Parra).

Scarus rubripinnis Cuv. & Val., xiv, 199, 1839 (San Domingo); Günther, iv, 211 (copied); Guichenot, Scaridés Mus. Paris, 13; (copied), ? Cope, Trans. Am. Phil. Soc., 1871, 462 (St. Croix).

? *Scarus virens* Cuv. & Val. xiv, 203, 1839. (Porto Rico; Martinique).

Scarus squalidus Poey, Memorias, ii, 218, 1860 (Cuba); Poey, Synopsis, 337; Jordan & Gilbert, Syn. Fish., N. A., 1883, 938 (Garden Key); Günther iv, 212, 1862 (copied).

? *Scarus chloris* Guichenot, Scaridés Mus. Paris, 1865, 14 (San Domingo, type of *Scarus virens*; not of Bloch & Schneider).

? *Scarus truncatus* Poey, Synopsis, 1865, 339; ? Poey, Enumeratio, 1875, 114.

Head, $3\frac{1}{6}$ ($4\frac{4}{5}$); depth, $2\frac{5}{8}$ ($3\frac{1}{2}$); length of the specimen described (Key West), $7\frac{1}{2}$ inches; body oblong; jaws pale in color; no canine teeth; upper lip covering most of upper jaw; eye rather small, $4\frac{3}{4}$ in head; snout bluntish, $2\frac{2}{5}$; cheek with a single series of about five large scales; tubes of lateral line dividing into about five branches, covering most of the scale; four scales on median line before dorsal.

Caudal fin slightly lunate, the upper lobe longer and narrower than the lower, $1\frac{1}{4}$ in head; the prolongation of the outer rays varies somewhat and is greatest in adult examples; the concavity of the fin is evident in specimens 3 inches long, but in the very young the fin is truncate, or even slightly convex. A few specimens of 6 to 8 inches are in the collection in which the caudal fin appears fairly truncate when spread open, the angles remaining acute. In most cases, however, the fin is slightly concave.

The caudal fin has essentially the same form in *Sparisoma frondosum*, *flavescens*, *abildgaardi* and *aurofrenatum*. In the other species mentioned in this paper it is materially different.

Color of adult in life olivaceous, somewhat clouded with light and dark, and usually flushed with pinkish especially below, the edges of the scales more yellow olive; scales of belly and lower parts light orange-

red towards their bases, giving a decidedly reddish cast; dorsal mottled with different shades of olive; caudal creamy, mottled and barred with darker orange, the markings more distinct on the outer edge; ventrals and anal rich cherry red, mottled or barred with brown; pectorals light orange-red, the color formed by narrow orange cross-streaks on a paler ground; a light band across lower jaw, which is otherwise brown; teeth white; a dusky or black blotch at base of pectoral. Sometimes blackish spots on the scales at the base of soft dorsal. In spirits the red of body and fins and yellow on scales become pale.

Young specimens have small, bright, rosy spots on sides of back; two faint darker longitudinal shades along sides.

This species is excessively common at Key West, swarming everywhere about the island, in the eel-grass. It rarely exceeds a foot in length. At Havana it is apparently equally common, the numbers seen in the market exceeding that of all the other species combined. It is the least brightly colored of the species mentioned in this paper. As a food fish this, like the others, is held in low esteem. The flesh, although not unpleasant in flavor, is soft and rather poor. In the Havana market it is usually called *Vieja colorada*, but the species of this group are seldom distinguished by fishermen.

We follow Poey in identifying with this species the *Vieja* of Parra, which is made the type of *Scarus flavescens* of Schneider. Valenciennes has made of this "Vieja," a *Calliodon*, and Bleeker a *Callyodontichthys*. Parra's figure seems not unlike this species, but we should not have ventured so to consider it except for the authority of Poey. There seems to be little doubt that this species is the original *Scarus rubripinnis* as well as the *Scarus squalidus* of Poey. The *Scarus virens* C. & V., and *Scarus truncatus* of Poey either belong to this species or to some one very closely related to it, perhaps distinguished by a truncate caudal.

If the name *flavescens* is considered too uncertain for adoption, the much more appropriate *Sparisoma rubripinne* comes next in order of time.

There is considerable variation in the amount of redness in this species, large ones being usually more rosy than the young.

7. *Sparisoma frondosum*.

Scarus frondosus Cuv. & Val. xiv, 204, 1839 (Brazil); Guichenot, *Scaridés*, Mus. Paris, 1865, 15 (Bahia) (not of Günther = *Scarus distinctus* Poey).

Scarus brachialis (misprinted *bragnialis*) Poey, *Memorias*, II, 345, 1861 (Cuba); Poey, *Synopsis*; 337, Poey, *Enumeratio*, 113.

Head, $3\frac{1}{5}$ (4); depth, $2\frac{7}{8}$ ($3\frac{4}{7}$); length of example described (Havana), $7\frac{1}{2}$ inches.

Body moderately deep.

Jaws pale. No canine teeth. Upper lip covering most of upper jaw.

Eye rather large, $4\frac{1}{2}$ in head; snout rather acute, 3; cheeks with a single row of about four large scales. Each pore of lateral line with

four to seven branches, which cover most of the scale. Four scales on median line before dorsal.

Caudal fin moderately lunate, the middle part a little convex when the fin is spread open; the outer rays moderately produced; the upper lobe $1\frac{2}{5}$ in head.

Color in spirits dark olive green above, somewhat mottled; paler below. A faint greenish streak running backward from angle of mouth. No distinct spots or stripes on body. Teeth pale. Dorsal dusky gray. Caudal pale, immaculate, the outer rays above and below green. Anal dusky gray, somewhat mottled. Ventrals and pectorals pale, slightly greenish; a distinct dark blotch at base of upper rays of pectoral; the axil pale.

A single specimen of this species was obtained at Havana. Its life colors were not noticed. In spirits its colors are quite different from those of *S. flavescens*, though in other respects the two bear much resemblance.

Our specimen agrees equally well with the descriptions of *frondosus* and *brachialis*. We conclude, therefore, that the two are identical. The *frondosus* of Günther is evidently not the same, and Poey is probably right in identifying it with his *Scarus distinctus*.

8. *Sparisoma chrysopterum*.

Vieja Parra, Descr., Dif., Piezas Hist. Nat. 1787, 58, pl. 28, f.4. (Cuba.)

Scarus chrysopterus Bloch & Schneider. Syst. Ichth., 1801, 286, pl. 57 (American seas); Cuv. & Val., xiv, 185, 1839 (St. Thomas); Günther, 1862, 12, (Martinique; Jamaica), Guichenot, Scaridés Mus. Paris, 12, 1865 (San Domingo; Guadeloupe); Cope, Trans. Am. Philos. Soc., 1871, 462 (St. Croix; St. Kitts).

Scarus chloris Bloch & Schneider. Syst. Ichth., 1801, 289 (after Parra); Goode, Bull. U. S. Nat. Mus., v. 1876, 34, (synonymy).

Scarus lateralis Poey, Memorias II, 219, 1860 (Cuba); Poey, Repertorio, I, 373, 375; II, 162; Poey, synopsis, 337; Poey, Enumeratio, 112.

Head, $3\frac{1}{4}$ ($4\frac{1}{4}$); depth, $2\frac{7}{8}$ ($3\frac{4}{5}$); length of the example described (Havana), 13 inches.

Body oblong.

Jaws pale. A strong canine directed outward and backward toward angle of mouth in upper jaw; besides this about three smaller canines toward the front of the jaw; most of these turned forward. Upper lip covering about half of upper jaw.

Eye $5\frac{3}{8}$ in head; snout not obtuse, $2\frac{3}{4}$; cheek with a single row of three or four large scales. Each pore of lateral line ramose, many times forked and covering most of the scale; the pores more branched than in any other of our species. Four scales on median line before dorsal.

Caudal deeply lunate. The outer rays much produced. The upper lobe longest, twice as long as inner rays, as long as head.

Color in life bright blue, almost everywhere tinged with green. Dorsal and anal and middle of caudal brick red; edge of caudal blue.

Ventrals bluish green. Pectoral greenish yellow; its base red around a large black spot.

In spirits the blue is more or less faded, leaving the fish chiefly green, darker on head. The red and yellow of fins become pale grayish.

According to Poey there is usually a dark blue horizontal stripe along sides behind pectoral fin.

A single rather large specimen was obtained in the Havana market.

There has been no disagreement among recent writers as to the synonymy of this species. Goode, in adopting for it the name *chloris*, has overlooked the slight priority of *chrysopterum*, and Poey has preferred to set both aside on account of imperfections in the description and of the error involved in the name of *chrysopterum*, none of the fins being really golden.

The identification of Parra's figure has been rendered certain by a colored drawing of the original type of Parra, sent by Graëlls to Poey, and by him presented to the present writer.

The original figure of this species, published by Bloch & Schneider, is atrocious as to form, but not uncharacteristic as to color or dentition. It may have been made from a dried and distorted skin.

9. *Sparisoma lorito*, sp. nov.

Head, $3\frac{1}{5}$ (4); depth, $2\frac{5}{6}$ ($3\frac{4}{5}$); length of typical example (Havana), 10 inches.

Body oblong, moderately deep.

Jaws pale; one or two small canines on each side, directed outward and backward, in front of the angle of the mouth, one on one side, two on the other, in the typical specimen; upper lip covering more than half of upper jaw.

Eye rather large, $4\frac{2}{3}$ in head; snout rather acute, $2\frac{2}{3}$; cheeks with a single row of large scales. Pores of lateral line less branched than usual in this genus, not covering nearly the whole surface of the scale; those on the caudal peduncle most branched; those of the anterior region mostly once or twice forked. Four scales on median line before dorsal.

Caudal fin deeply lunate, the outer rays much produced, the upper lobe slightly the longer, nearly twice as long as inner rays and nearly as long as head.

Color in life pearly blue, the color mixed with greenish and gray; teeth pale; dorsal reddish, tinged with gray; lobes of caudal greenish-gray, washed with brown; center of fin reddish; posterior margin grayish; anal rather dull scarlet mixed with gray; ventrals pinkish; pectorals light yellowish-olive, a large black blotch at base above; color in spirits brownish-olive in dorsal region, grayish-olive mixed with crimson on sides, and light-green below; head greenish, purplish on cheeks, light-green below; lips green; dorsal and anal orange; the rays grayish-dusky; caudal pale orange, the outer rays greenish; the

posterior margin of fin dusky; ventrals flesh-color, tinged with pinkish; pectorals orange-olive, the base of upper rays with a dark spot, its axil pale.

A single adult specimen taken at Havana.

This species is related to *S. chrysopterum*, differing in the presence of but a single canine, in the less branched pores of the lateral line, and in the coloration. We are not able to identify it with any of Poey's species. The name *Lorito* is a diminutive of *Loro*, parrott, the name generally given to the blue *Scari* by the Cuban fishermen.

10. *Sparisoma aurofrenatum*.

Scarus aurofrenatus, Cuv. & Val., xiv, 1839, 191 (San Domingo); Günther, iv, 212 (Cuba, Jamaica, Trinidad); Guichenot, *Scaridés Mus. Paris*, 1865, 13 (San Domingo); Cope, *Trans. Am. Philos. Soc.*, 1871, 46 (St. Croix; St. Martins).

Scarus miniofrenatus Poey, *Memorias*, II, 279, 393, 1860 (Cuba); Poey, *Repertorio*, I, 1867, 374; II, 164, 1868; Poey, *Synopsis*, 337; Poey, *Enumeratio*, 1875, 111.

Head, $3\frac{1}{4}$ (4); depth, $2\frac{3}{4}$ ($3\frac{1}{2}$); length of example described (Havana), $8\frac{1}{2}$ inches.

Body elliptical-oblong.

Jaws pale in color; teeth less distinct than usual in this type, the edge of the upper jaw nearly entire, the edge of the lower jaw more uneven. A small canine in front of the angle of the mouth on each side (this obsolete on both sides of one of the three specimens examined). A small canine near suture of upper jaw on both sides usually present; upper lip covering more than half of upper jaw.

Eye rather large, $4\frac{2}{3}$ in head; snout not blunt, $1\frac{5}{7}$ in head; cheeks with a single row of 4 or 5 large scales; four scales on median line before dorsal; pores of lateral line much branched, covering most of the scales.

Caudal fin moderately lunate, the upper lobe the longer, $1\frac{2}{7}$ in head, $1\frac{1}{2}$ times length of middle rays.

Color in life purplish brown, becoming reddish on sides, and finally livid greenish below; head purplish-violet about eyes; side of head with a stripe of vivid scarlet running from corner of mouth just below and slightly past eye, a second short streak of the same color above the first behind eye; a golden-orange spot rather smaller than eye on and below the fifth scale of the lateral line, its upper portion black; dorsal orange, slaty at base, posteriorly; caudal, scarlet at base, then blood red, yellowish in the center, whitish behind, the projecting tips of both lobes black, the whole fin faintly mottled and barred with dusky; anal crimson, its edge light blue; ventrals livid purplish; pectorals light yellowish, bluish in axil, dusky at base in front. In spirits the orange and red colors fade to light yellowish. A more or less distinct dark stripe on each row of scales below the lateral line, paler on lower rows; pale greenish about eyes; dusky on snout above; edge of scales on body above, and on sides more or less dusky.

This species is rather common at Havana, where three specimens were obtained. In color it is one of the most strongly marked and handsomest species. The name *aurofrenatum* is rather unfortunate, as the stripe on the head is bright vermilion in life. This, however, does not justify us in the substitution for *aurofrenatum* of the name *miniofrenatus* of Poey.

11. *Sparisoma abildgaardi*.

Vieja Parra, Descr. Dif. Piezas Hist. Nat., 1787, 58, pl. 28, f. 2 (Cuba).

Sparus abildgaardi Bloch, Ichthyol., taf. 259, about 1790 ("America," from a specimen sent by Professor Abildgaard); Lacépède, Hist. Nat. Poiss., iv, 55, 163, 1802 (copied).

Scarus abildgaardi Cuv. & Val., xiv, 175, 1839 (St. Thomas; Bahia); Günther, iv, 209 (Puerto Cabello); Guichenot, Scaridés, Mus. Paris, 10 (Bahia; San Domingo); Poey, Repertorio I, 371, 1867, II, 160; Poey, Synopsis, 337; Poey, Enumeratio, 111; Cope, Trans. Am. Philos. Soc., 1871, 461 (St. Croix; St. Martins).

Sparisoma abildgaardi Swainson, Nat. Hist. Class'n, Fishes, &c., II, 1839, 227.

Scarus coccineus Bloch & Schneider, Syst. Ichthyol., 1801, 289 (after Parra); Cuvier, Règne Animal, 1829, ed. II.

Sparus aurcoruber Lacépède, Hist. Nat. Poiss., iv, 55, 163, 1803 (on a drawing by Plumier).

Scarus amplus Ranzani, "Nov. Comm. Acad. Scient. Inst. Bonon., t. 5, p. 324, pl. xxv, 1842" (*vide* Guichenot).

Scarus erythrinoides Guichenot, Scaridés, Mus. Paris, 10, 1865 (San Domingo).

Scarus oxybrachius Poey, Synopsis, 1868, 342 (Cuba); Poey, Enumeratio, 115, lam. 14, f. 2.

Head, $3\frac{1}{5}$ ($3\frac{1}{8}$); depth, $2\frac{1}{8}$ ($3\frac{1}{2}$); length of example described (Havana), 8 inches.

Body rather deep. Jaws pale; a small, bluntish canine on each side of upper jaw in front of angle of mouth; upper lip covering most of upper jaw.

Eye rather large, $4\frac{1}{2}$ in head; snout rather acute, $2\frac{1}{8}$; cheeks with a single row of large scales; each pore of lateral line with 5 to 8 branches covering most of the scale; four scales on median line before dorsal.

Caudal fin slightly lunate; the middle a little convex when spread open; the outer rays slightly produced; the upper rays $1\frac{1}{2}$ in head in the largest specimens examined.

Color in spirits almost plain dark brown, somewhat mottled with paler; a few dark dots on opercle, the edge of the opercle being more or less blackish; pale gray below, from tip of lower jaw to caudal; teeth pale, tinged with reddish; all the fins pale, the dorsal narrowly edged with dusky, the fin somewhat mottled with darker; axil of pectoral pale, the base dusky above.

In life the dorsal, caudal, lower fins, and belly are bright cherry-red; rest of body brown, tinged with red; pale dots and mottlings on sides of head and on body.

Several specimens of this species were obtained at Havana, where it is not uncommon.

We suppose this to be the original *Sparus abildgaardi* of Bloch, although none of the earlier descriptions are good or even accurate. The *Scarus coccineus* of Bloch & Schneider seems to belong certainly here. The description given by Guichenot of his *Scarus erythrinoides* fits our specimens well; better than his account of *Scarus abildgaardi*. We do not see that Poey's *Scarus oxybrachius* can be different. The sharpness of the pectoral is probably merely accidental. The pectoral is a little longer in proportion to the head in this species than in most others, but this difference seems to be due to the fact that the head is rather shorter.

The description of *Scarus amplus* we have not seen.

12. *Sparisoma cyanolene*, sp. nov.

Head, 3 ($3\frac{3}{4}$); depth, $2\frac{3}{4}$ ($3\frac{2}{5}$); length of specimen described (Key West), $5\frac{1}{2}$ inches.

Body oblong.

Jaws pale; a single stout canine directed outward and usually slightly backward on each side of upper jaw, in front of angle of mouth; a second canine often present in front of this; a small canine directed downward on each side in front of upper jaw above the cutting edge and close to the median suture; upper lip covering most of upper jaw.

Eye moderate, $4\frac{1}{2}$ in head; snout rather obtuse, 3; cheek with one row of large scales; pores of lateral line each with 4 to 6 branches, which cover nearly the whole of the scale; four scales on median line before dorsal.

Caudal slightly convex when spread open, the outer rays scarcely as long as the median ones, $1\frac{1}{2}$ in head.

Lower pharyngeal nearly twice as broad as long; its upper surface almost flat, less concave than in related species.

Color in life on upper half of body olive-green, the color very much mottled and specked, marbled with whitish and streaked with green; lower parts fleshy-red, equally and similarly mottled; top and front of head most extensively mottled; sides of head similarly mottled; lower jaw usually more or less brown, with two whitish bands, the anterior continuous, the posterior of four separate whitish blotches; edge of opercle bright greenish-blue; axil extensively deep blue, with some reddish spots; a deep blue blotch on base of pectoral; dorsal colored like the back; caudal greenish at base, with a pale yellowish band and some small whitish dots; its edge blackish, the fin elsewhere translucent; anal dull gray with orange, mottled with brown; ventrals pale flesh color.

The yellow and orange of fins and red of belly become grayish in spirits. The blue of the axil becomes dark green in spirits, but does not disappear.

This little fish is very abundant about Key West, where many specimens were taken with the seine in the kelp. None of these were more than 6 inches in length, and as they were sexually mature at that size it is not likely that they grow much larger.

The species does not appear to have been previously described. The prevalence of blue around the base of the pectoral is a striking color mark and has suggested the specific name. This blue does not disappear in alcohol.

This species was not obtained at Havana.

13. *Sparisoma zystrodon*, sp. nov.

Head, $3(3\frac{5}{7})$; depth, $3\frac{5}{7}$; length of an example from Key West, $4\frac{3}{4}$ inches.

Body oblong.

Jaws pale; upper jaw with three or four exerted canines on each side above the cutting edge, the largest in front of the angle of the mouth, curved outward and somewhat backward; the others farther forward, one of them being near the median suture; upper lip covering most of upper jaw.

Eye moderate, $4\frac{1}{2}$ in head; snout bluntish, $2\frac{4}{5}$; cheek with one row of 4 or 5 scales; pores of lateral line, each with 3 to 6 branches, covering most of the scale; four scales before dorsal.

Caudal fin slightly convex when spread open; its outer rays scarcely as long as middle ones, $1\frac{1}{2}$ in head.

Color in life bright olive-green above, paler below; the upper parts very much mottled, speckled with white and marbled with coppery-red on various scales. Head similarly green, dotted with whitish above, a narrow ring of bright blue above eye, interrupted above; a blue stripe from it straight to angle of mouth; blue and coppery markings on opercle; lower parts of head light yellow; a blue band around lower jaw; axil and a spot at base of pectoral in front above deep blue-black; dorsal orange flesh-color, its tip paler; caudal yellow at base, paler beyond, its posterior portion more or less jet black; the fin with a few whitish dots toward the base; anal light bluish and reddish, its tip dusky; ventrals pale; pectorals light yellowish; lining of opercle blackish.

Other specimens having the same markings were pearly-bluish rather than green above, livid below; the blue on head paler, the red of a light yellowish-carmine. Some highly-colored specimens are greener, with belly bright yellow, brightest at throat; anal and caudal chiefly jet black.

In spirits this species is dark olive-green above, paler below; caudal and anal very broadly margined with black. Black bar across base of pectoral very distinct. The amount of black on caudal and anal seems to depend on age, the very young showing scarcely any.

This species is found in the eel-grass and *Fucus* about Key West, in

company with *S. cyanolene*, and it is equally abundant with the latter. It reaches a still smaller size, none of the many specimens obtained exceeding 5 inches in length. These are sexually mature.

This species is closely allied to several (*radians*, *lacrimosum*, *atomarium*, *hoplomystax*) found in the West Indies, but we think it distinct from all of these.

One or two specimens thought to belong to this species were seen in the market at Havana.

C. Genus CRYPTOTOMUS.

CALLIODON Cuvier, Règne Animal, 1829, ed. II. (*spinideus*) (not of Gronow, nor of Bloch & Schneider.)

CALLYODON Cuvier & Valenciennes, Günther, Guichenot, Poey, Stindachner, Jordan & Gilbert.

CRYPTOTOMUS Cope, Trans. Am. Phil. Soc., 1871, 462, (*roseus*).

This genus is closely related to *Sparisoma*, differing from it in having the anterior teeth nearly separate at all ages and in having the dorsal spines flexible as in *Scarus*. The dentition approaches that of a very young *Sparisoma*.

The genus *Calliodon* of Gronow and of Bloch & Schneider was based on a species which apparently belongs to the genus *Scarus*. The name was transferred by Cuvier from the type of *S. croicensis* to the present group. This transfer is inadmissible in our view, and the name *Calliodon* should not be used for the genus.

The name *Cryptotomus* was proposed by Cope for a fish having the "dentition of *Callyodon*, but with the numerous dorsal and anal spines of the group of *Harpe*." The fin rays are given D. XI, 8; A. III, 8. The numbers in all known species of *Scarina* are D. IX, 10; A. III, 9 (8). We do not believe in the existence of the genus *Cryptotomus* as thus defined. It seems to us almost certain, either that Professor Cope has mistaken two of the soft rays of the dorsal and one of the anal for spines, or else that these rays are in the sole specimen known, abnormally ossified. The difference between spines and soft rays in this group is very slight. We therefore regard *Cryptotomus* as a synonym of *Callyodon* Cuvier, and the latter name being ineligible, we adopt *Cryptotomus* as the name of the genus.

ANALYSIS OF SPECIES OF CRYPTOTOMUS.

COMMON CHARACTERS.—Lower pharyngeal and upper pharyngeals, isthmus, and lateral line precisely as in *Sparisoma*; lateral teeth of upper jaw coalescent into a more or less continuous cutting edge; the teeth more separate posteriorly; free posterior canines often present; anterior teeth separate or coalescent at base only; lower jaw with a single series of partly coalescent teeth laterally, and two or more series of nearly separate teeth anteriorly; median suture of jaws not evident; dorsal spines flexible; jaws subequal; scales about head large, a single row on cheeks, four or five on median line before dorsal. Species of small size.

a. Posterior canines, none; upper lip double for its entire course, the inner fold becoming mesially very narrow; caudal subtruncate; body slender; color olivaceous, much mottled, sides with faint whitish stripes; head with some greenish spots; fins pale, mottled with olive. BERYLLINUS, 14.

14. *Cryptotomus beryllinus*, sp. nov.

Head, $3\frac{1}{6}$ ($3\frac{5}{6}$); depth, $3\frac{1}{3}$ ($4\frac{1}{5}$); length of an example from Key West, $5\frac{1}{4}$ inches.

Body more elongate than in related species; compressed.

Jaws pale, the median suture not evident; central portion of each tooth with a reddish-brown spot. Upper jaw laterally with a continuous cutting edge of coalesced teeth; this edge is even along the middle of the jaw and somewhat serrate posteriorly; anteriorly the cutting edge gives place to about two series of lanceolate, rather obtuse, compressed teeth, which coalesce at base only; no posterior canines in any of the many specimens examined. Lower jaw laterally with a single series of compressed teeth, coalescent for a short distance and close set. In front are two or three series similar to those in the upper jaw.

The chief difference between the teeth of this species and those of *Sparisoma* is in the separation of the anterior teeth of both jaws and in the distinctness of the lateral teeth of the lower jaw.

Jaws subequal, the lower very slightly included. Upper lip double for almost its entire length, its inner fold narrow mesially; the lip covering most of upper jaw. Isthmus moderate, the gill-membranes not forming a fold across it.

Eye moderate, $4\frac{1}{2}$ in head; snout rather acute, $2\frac{3}{4}$; cheek with a single row of about 5 scales; four or five scales on the median line before dorsal.

Lateral line subcontinuous, its tubes each with four branches, which cover most of the scale.

Dorsal spines very slender, not pungent; caudal fin slightly rounded, its outer rays $1\frac{1}{3}$ in head.

Lower pharyngeal formed exactly as in *Sparisoma*; not quite twice as broad as long, the surface slightly concave.

Color in life, olive-green, or olive-gray, mottled above with darker and whitish with small blotches; some whitish blotches above lateral line; some along lateral line; a row of five or six, smaller than pupil, in a straight line below lateral line; five or six faint greenish blotch-like areas along sides; two or three narrow, parallel whitish stripes more or less distinct along lower parts of sides bordered with brownish, the upper running from below eye straight to middle of caudal, the lower passing just below pectoral; some whitish bands radiating from eye; usually some dark green spots before and behind eye; top of head vermiculate and dotted with black; a brown band across chin; dorsal pale, mottled with olive; a dusky blotch on front of dorsal; caudal greenish, edged with brown, its outer rays barred with brown and light olive, speckled and barred with brown; ventrals pale, faintly barred with brown; pectorals pale; vertical fins in adult edged with light brownish-red. The whitish lines of sides become fainter with age.

In spirits the brown coloration gives place to grayish or greenish, each scale often with a greenish blotch.

This species is common about Key West on muddy bottoms. Numerous specimens of various ages were obtained, the largest about 6 inches in length. A single rather large specimen was secured in the market at Havana.

This species differs from *C. ustus*, and from the descriptions of *C. dentiens*, &c., in the entire absence of posterior canines in both young and old examples. *C. roseus*, which has no posterior canines, is very differently colored.

INDIANA UNIVERSITY,
April 8, 1884.

DESCRIPTION OF A NEW SPECIES OF SPHÆRIUM.

By TEMPLE PRIME.

Sphærium costaricense Prime.

Shell elongated, somewhat compressed, inequilateral; margins rounded, sulcations regular, deep; epidermis dark brown; cardinal teeth small; lateral ones strong.

Longitude, 12.0; latitude, 9.0; diameter, 6.0 millimeters.

Habitat.—Central America in Yuriria Lake, West Costa Rica; collected by the late Prof. W. M. Gabb, and presented to the United States National Museum by W. H. Dall. Number for the specimens on the Museum register, 37251.

This species is allied to *S. simile* and *S. striatinum*.

As far as I am aware this is the only instance known of the occurrence in Central America of the genus *Sphærium*, properly so called. As a rule this genus is replaced south of Mexico by the genus *Limosina*, a section of the original genus *Sphærium*.

New localities for American Corbiculida.

Sphærium striatinum Lam. San Joaquin River, California, near Stockton. H. Hemphill.

Pisidium virginicum Bourguignat. Yukon River, Alaska, near the Russian mission. W. H. Dall.

Pisidium abditum Haldeman. Pools on the north part of Unga Island, Shumagin group, Alaska, between Popoff Strait and Coal Harbor. W. H. Dall.

Pisidium equilaterale Prime. Bering Island, Commander group, Bering Sea, in a pond near the Ladyginsk village. Dr. Leonhard Stejneger. Kotzebue Sound, in the clay covering the ice-cliffs of Elephant Point, Eschscholtz Bay; fossilized. W. H. Dall.

Dr. Carl Agardh Westerlund, of Rönneby, Sweden, who is working up the land and fresh water shells of the Vega expedition, has described the following species of *Pisidium* in the *Nachrichtsblatt der Deutschen*